中国水利 CHINA WATER

NHRI Since 1935 南京水利科学研究院

The 11th CEWP High-Level Dialogue Conference
中欧水资源交流平台第十一次高层对话会

Impacts of Climate Change on Water Resources and China's Response
气候变化对水资源的影响与中国应对

Prof. Jiqun DAI

President, Nanjing Hydraulic Research Institute (NHRI), P. R. China

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NHRI Briefing 南京水利科学研究院简介-1

Earliest Comprehensive Water Research Institution in China

中国成立最早的综合性水利科研机构

Nanjing Hydraulic Research Institute of the Ministry of Water Resources, Ministry of Transport and National Energy Administration

- Established in 1935, engaged in fundamental research, applied basic research, and high-tech R&D in the fields of water resources, transport, and energy

建于1935年，主要从事水利、交通、能源领域的基础研究、应用基础研究和高新技术研发

- Over 60 fields of expertise;
- The first authorized to confer doctoral and master's degrees;
- High-caliber innovation team led by academicians

拥有60多个优势特色专业方向

国家首批具有博士、硕士学位授予权单位

拥有院士领衔的高水平创新人才队伍

International Cooperation Network

Expertise

NHRI Briefing 南京水利科学研究院简介-2

■ Prominent International Exchanges and Cooperations with European Partners

与欧方开展了广泛深入的国际交流与合作

Long Cooperation History 合作历史源远流长

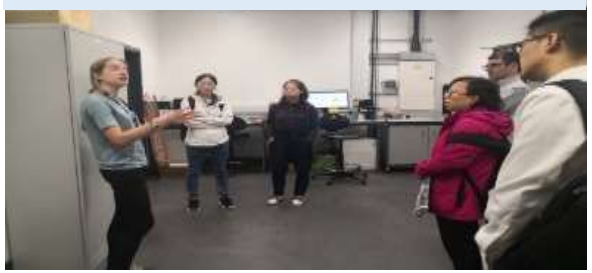
- In the 1930s, Chinese and Dutch experts collaboratively constructed a hydraulic laboratory hall in Nanjing, the largest in Asia

China-Netherlands Joint Water Engineering Laboratory

Joint Research in Water Sciences 水科学领域联合科研

- Newton Fund Projects
- Intergovernmental Science and Technology Cooperation Projects
- International Cooperation Programs of the National Natural Science Foundation of China
- Foreign Expert Recruitment Initiatives

UNESCO-IHP International Water Conference



Joint Research Center 国际科技合作基地

In 2015, a Joint Research Center was established in collaboration with Deltares, IHE-Delft, SEI, and Flanders Hydraulics, along with the establishment of a Small Hydropower Center in Serbia

Establishment of JRC

CEWP 中欧水资源交流平台

From 2018 to 2022, a joint research on "Sustainable Application and Integration of Hydropower in China and Europe" was conducted with European partners including Swedish Agency for Marine and Water Management, BOKU University, and University of Florence

CEWP Copertation Project

CONTENTS 汇报提纲

I Global Climate Change and Its Impacts
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III China's Call for Action on Future Climate Change Challenges
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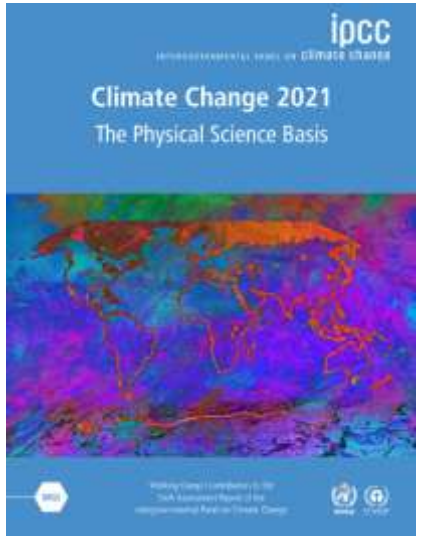
1.1 Global Warming is Now an Indisputable Fact
全球气候变暖已成不争事实

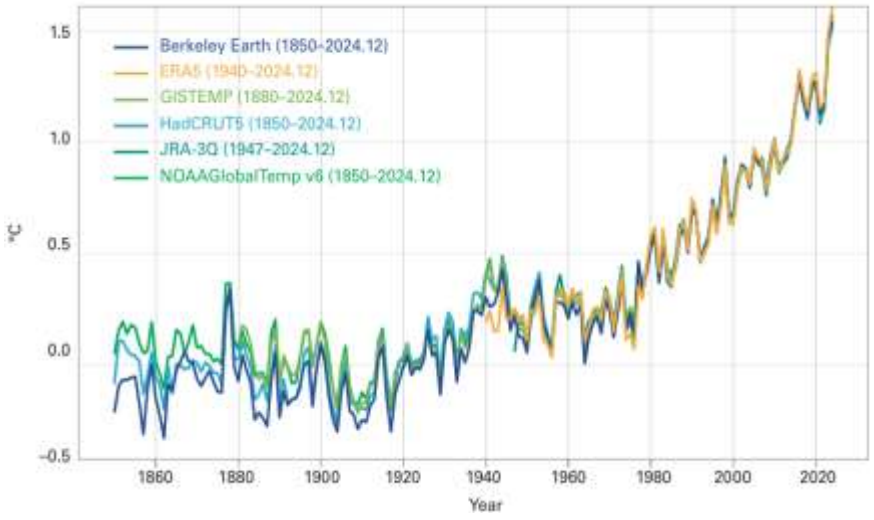
- **IPCC-AR6 (Aug. 9, 2021)**: The past decade (2011-2020) saw a global surface temperature increase of **1.09°C** compared to the pre-industrial period of 1850-1900

  近十年（2011-2020年）全球地表温度比工业化前水平(1850-1900年)升高了1.09℃

- **WMO (Mar. 19, 2025)**: The global annual average temperature in 2024 was **1.55 ± 0.13°C**, higher than the pre-industrial condition, approaching the 1.5°C limit set by the *Paris Agreement*

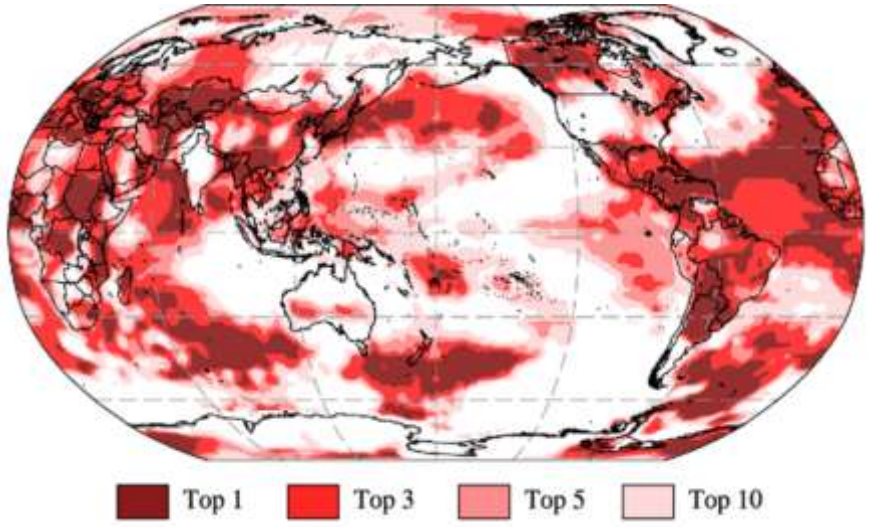
  2024年全球年均温度比工业化前高出了1.55 ± 0.13 °C，接近《巴黎协定》设定的1.5°C的极限





Global annual average surface temperature (1985-2024)

全球地表年平均温度(1985-2024)



Historical ranking of global average surface temperature (2023)

全球地表平均温度历史排名（2023）

1.2 Climate Change Severely Impacts Water Security
气候变化严重影响水安全

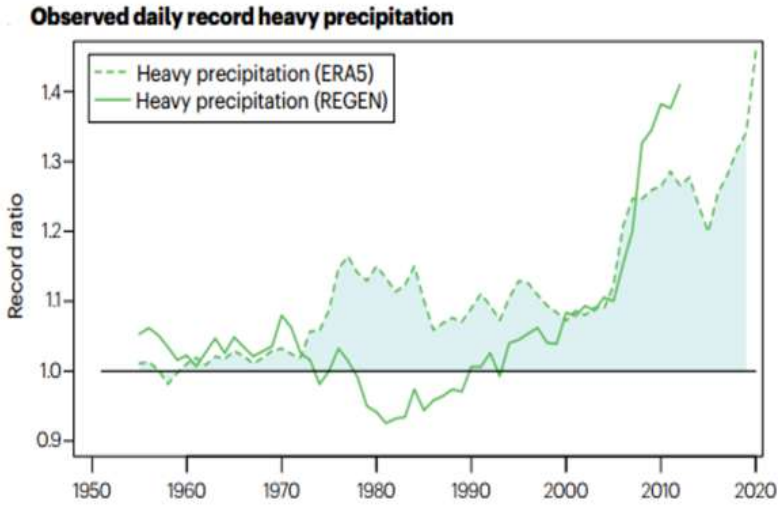
- **IPCC AR6**: Global extreme precipitation and drought events have increased sharply. Over the past 20 years, major flooding have risen by **40%–60%,** threatening the safety and infrastructure of over 1 billion people

  全球极端暴雨、干旱事件显著增多，近20年高影响洪涝事件上升40%~60%，威胁超10亿人口生命财产安全与关键基础设施稳定

- **2024 Global Natural Disaster Assessment Report:** Floods worldwide caused economic losses totalling USD **279.469 billion** between 2017 and 2023

  全球自然灾害评估报告（2024）：2017–2023年全球洪灾造成经济损失达2794.69亿美元

Increase in global extreme precipitation events: 40%

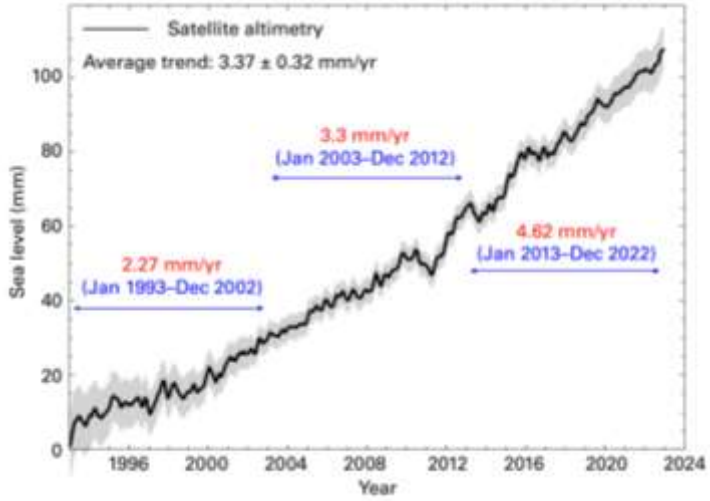


Observed global maximum daily precipitation
全球日最大降水观测值

Increase in global extreme drought events: 29%

In 2022, severe drought along Germany's Rhine River exposed century-old "hunger stones," markings of low water levels.
2022年德国莱茵河大旱重现百年"饥饿石"

Global mean sea level rise: 3.3 mm/year

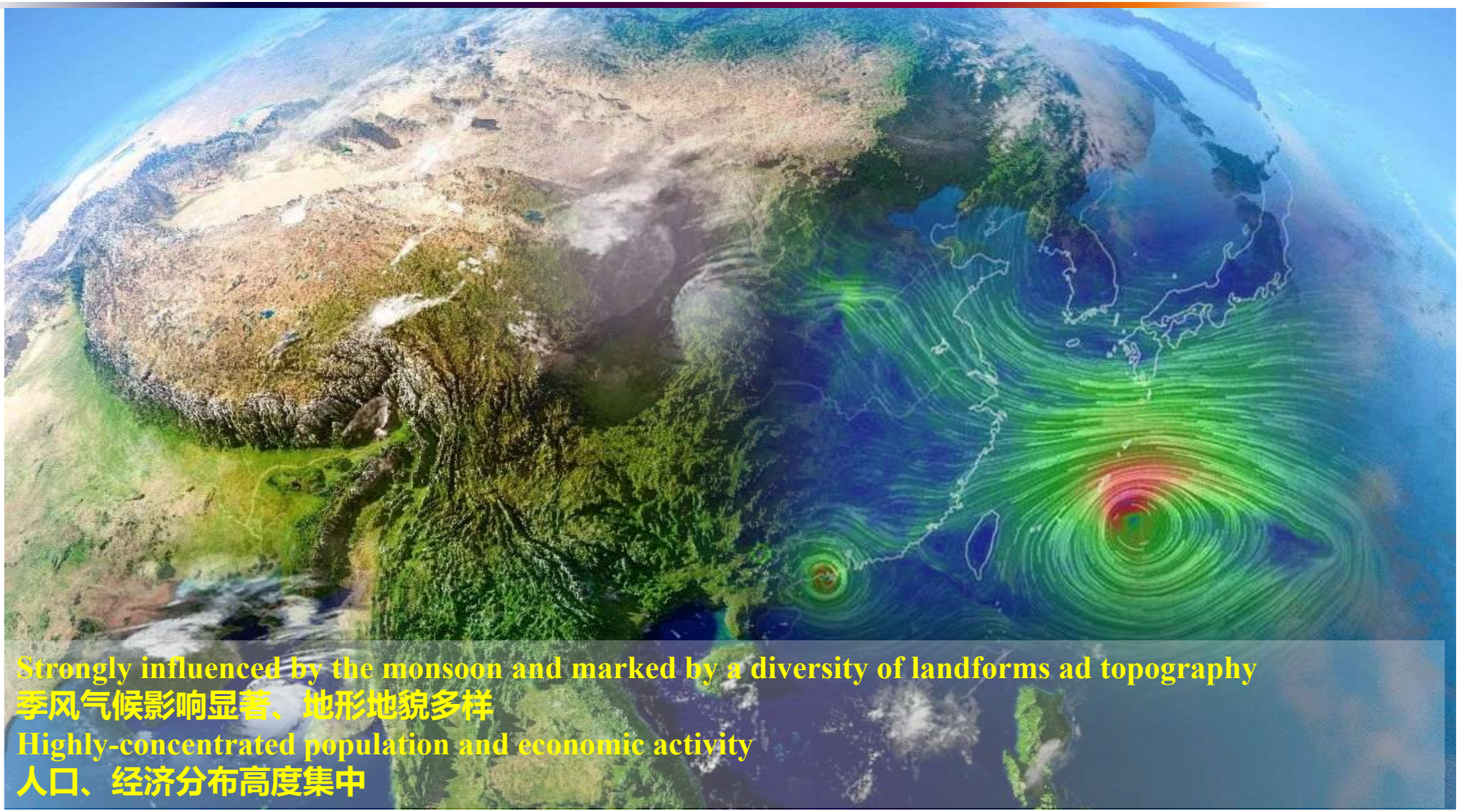


Global mean sea level change over the past 30 years
近30年全球平均海平面变化

Drought, water scarcity, and water ecosystem degradation continue to spread across multiple regions, posing severe challenges to water security.

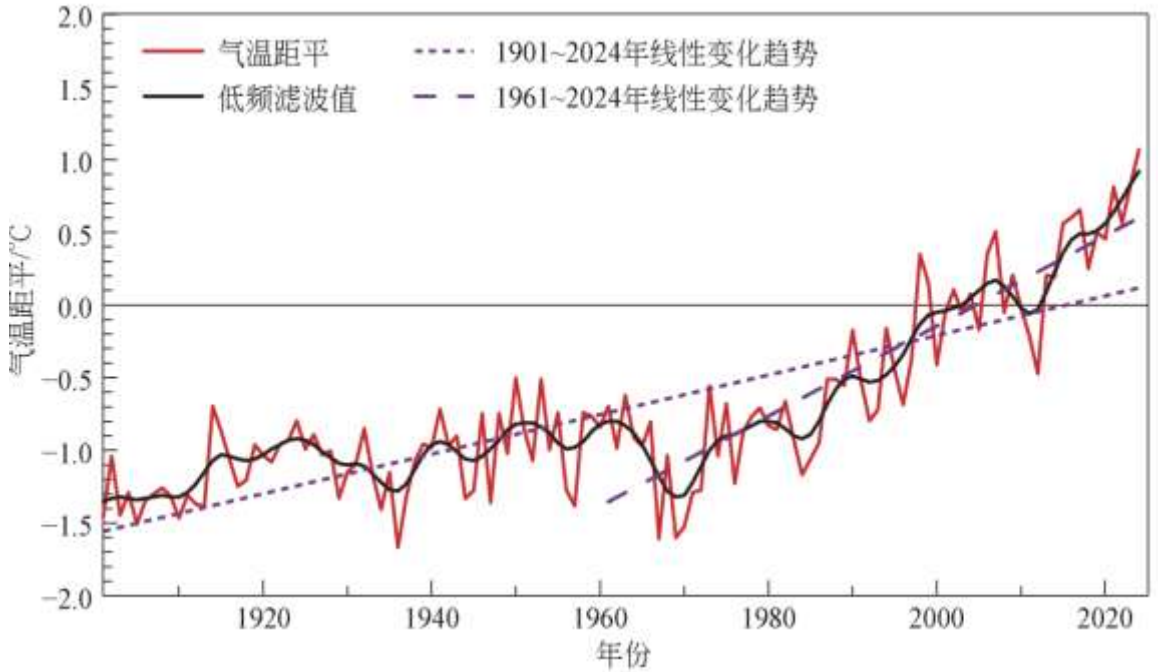
干旱、水资源短缺、水生态破坏等问题也在多个区域持续蔓延，对各国水安全保障体系构成严峻挑战

1.3 China is Sensitive and Highly Vulnerable to Global Climate Change
中国是全球气候变化的敏感区和影响显著区

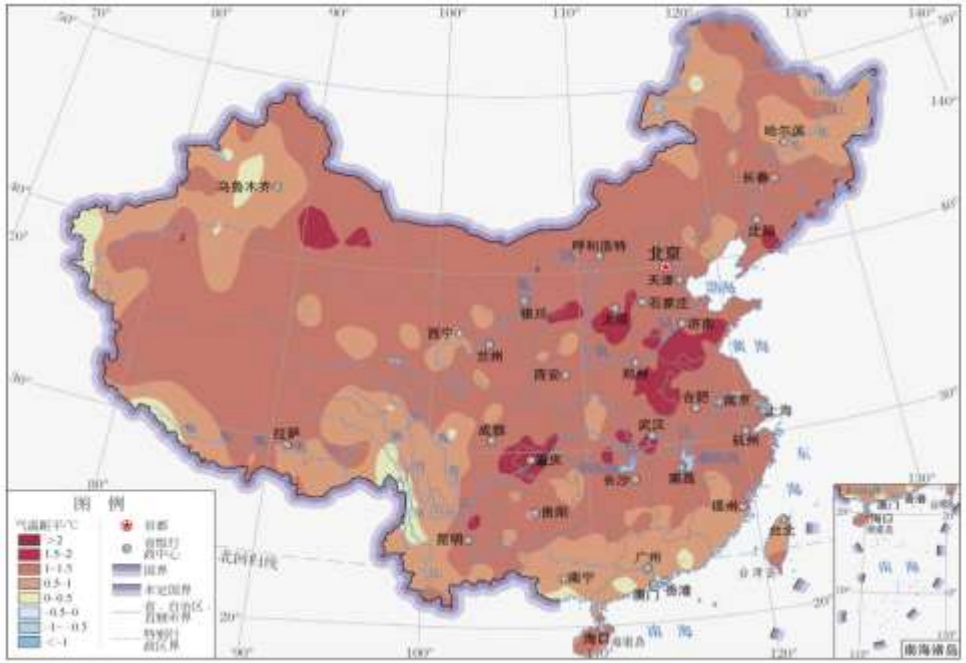


1.3.1 Climate Change in China is Particularly Pronounced
中国气候变化更加显著

- From 1961 to 2024, China's annual mean surface temperature rose significantly at a rate of 0.31℃/10a
  1961 - 2024年，中国地表年平均气温呈显著上升趋势 0.31℃/10a，高于同期全球平均升温水平
- In 2024, China experienced its warmest year since 1901, with the mean surface temperature 1.0℃ above the long-term average
  2024年，中国地表平均气温较常年值首次高出1.0℃，为1901年以来的最暖年份



China's surface temperature (1901-2024 vs. 1961-2024)
中国地表温度距平图 1901-2024 对比1961-2024



Distribution of surface temperature in China (2024)
中国地表温度距平分布（2024年）

Extreme flood and drought events in China are occurring more frequently, with greater spatial, temporal, and intensity variability
水旱灾害呈现极端水旱灾害事件频次增加，发生的地点随机、时间随机、强度随机的“一增加三随机”特点

1.3.2 Extreme Rainstorm-induced Floods Occur Frequently in China
中国极端暴雨洪水多发频发

- Rainstorm-induced floods are characterized by sudden onset, extreme intensity, and anomalous behavior

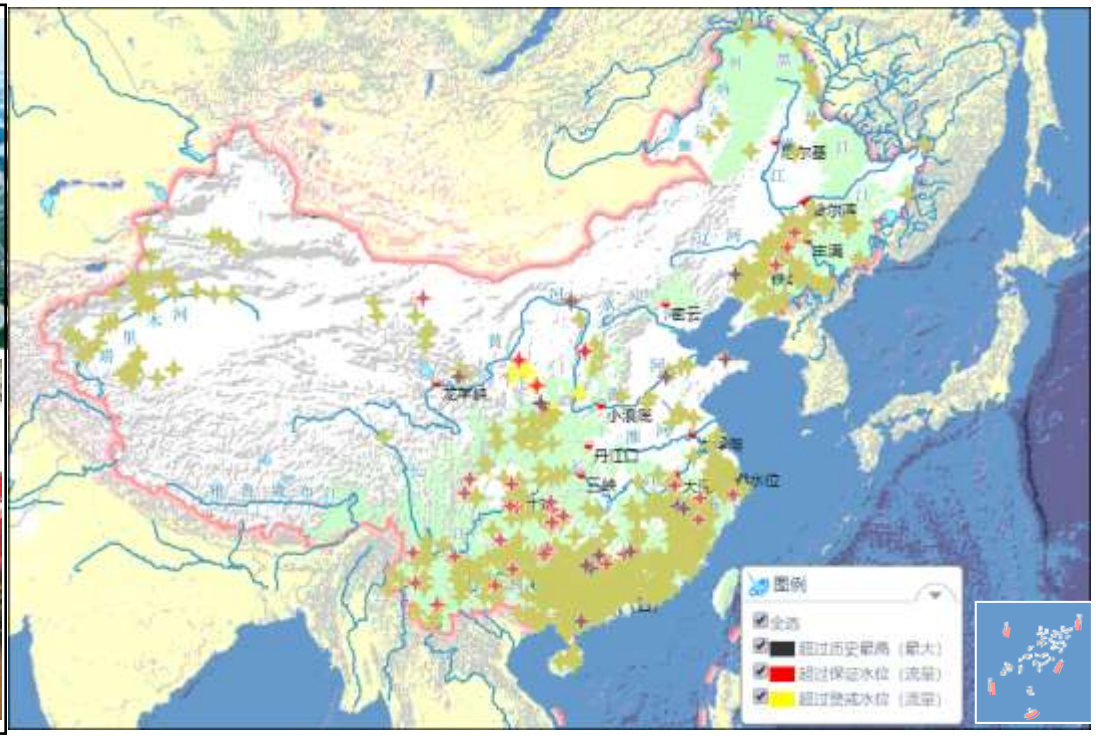
  暴雨洪水呈现突发性、极端性、反常性特点，致灾风险显著上升

- In 2024, a total of 1,283 rivers exceeded warning water levels, including 66 hitting record highs, continuously intensifying pressure on flood control and disaster relief

  2024年1283 条河超警戒水位，66条河出现历史极值，防洪救灾压力持续加大

“21·7” extreme rainfall event in Zhengzhou
郑州“21.7”极端暴雨

“23.7” catastrophic flood in the Haihe River Basin
海河“23.7”特大洪水



Distribution of extreme flood events in China in 2024 (Source: Information Center, MWR)
2024年我国极端洪涝分布（水利部信息中心）

1,283 rivers exceeded warning levels
1283 条河超警戒水位

287 rivers exceeded guarantee water levels
287条河超保证水位

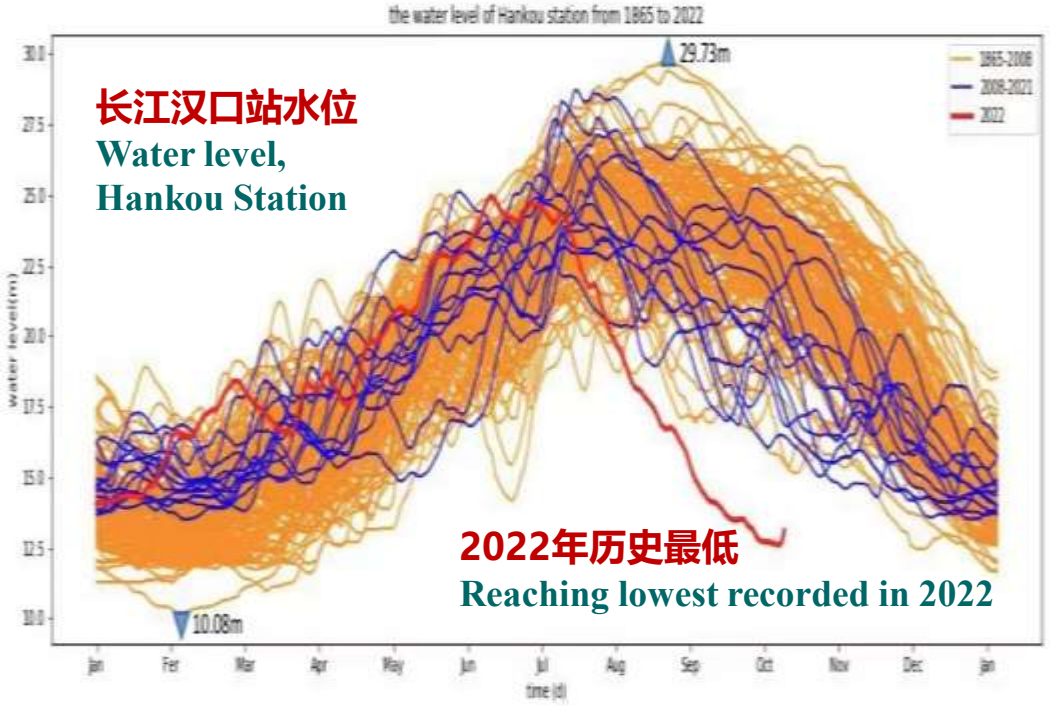
66 rivers recorded historical peak levels
66条河出现历史极值

26 numbered flood events occurred
26次编号洪水

1.3.3 Extreme Droughts in China are More Frequency and Widespread
中国极端干旱趋频趋广

- Markedly more frequent, intensive, and persistent droughts in China, exhibiting a trend toward "faster onset" and "extended duration". Large-scale droughts and rapid drought-to-flood transitions occur often

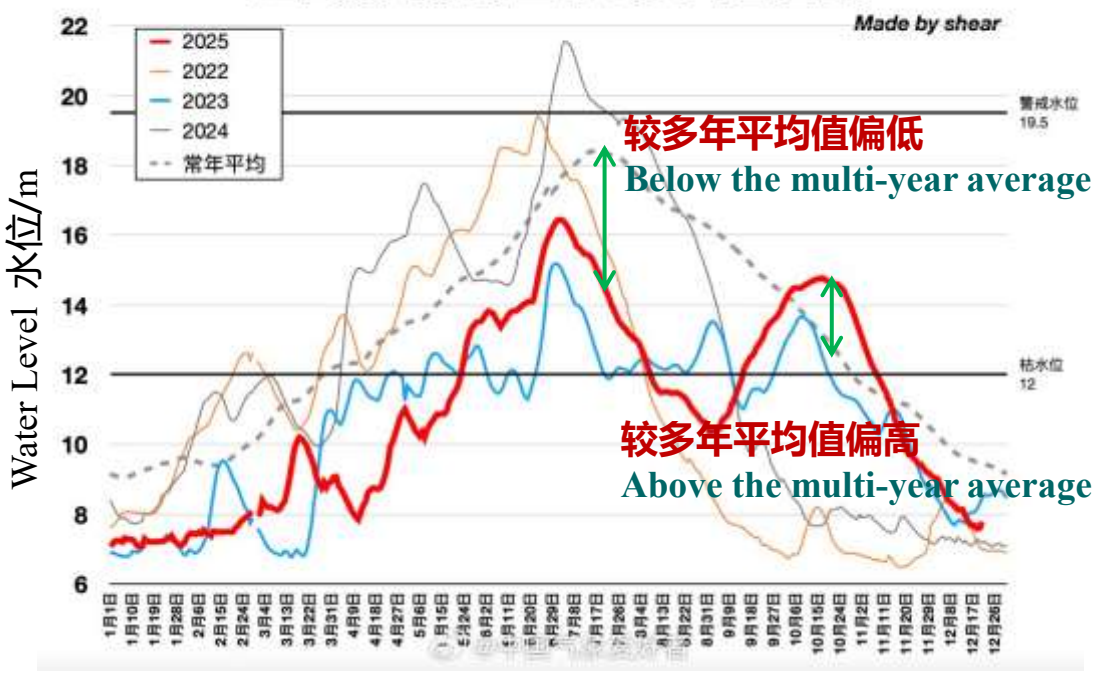
干旱频率、强度和持续时间显著增加，向"发生更快"与"持续更久"不断演变，大范围干旱和"旱涝急转"时有发生



A basin-wide extreme drought occurred in the Yangtze River Basin in 2022

长江流域2022年发生全流域性极端干旱

Water level curve at Xingzi Station, the Poyang Lake, Jiangxi



In 2025, a rapid drought-to-flood transition occurred in the Yangtze River Basin with water level in June nearly 30% below the multi-year average, and that in October nearly 25% above the average

长江流域2025旱涝急转，6月份水位比多年平均低近30%，10月份水位比多年平均高近25%

1.3.4 Sea Level Rise in China's Exceeds Global Average
中国海平面上升速率超过全球

- Over the past 30 years, sea level rise in China has outpaces the global average, intensifying **seawater intrusion, saline tides, and coastal infrastructure damage**, and further exacerbating water resource challenges

过去30年中国沿海海平面上升高于同时期全球平均水平，导致海水入侵、咸潮上溯、基础设施损坏等问题，进一步加剧水资源问题

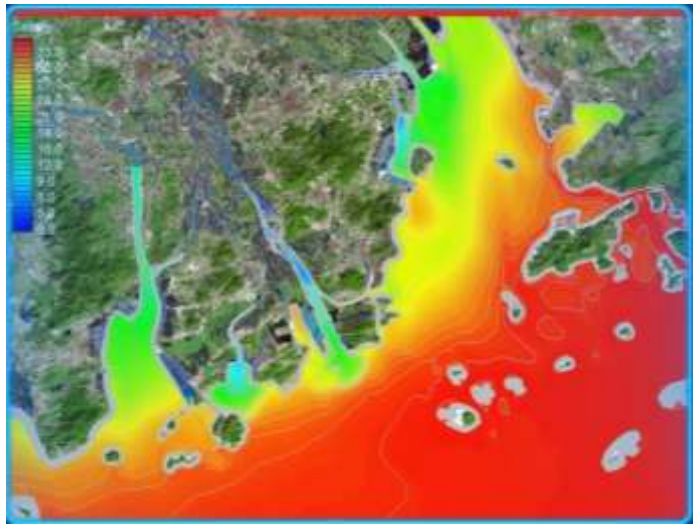
Infrastructure erosion by seawater

Seawater erodes ports and accelerates infrastructure damage
海水侵蚀港口，加速基础设施损伤

Seawater intrusion

The Liaohe River Estuary in 2024 suffered the severest seawater intrusion in history
2024年辽河口发生数十年来最大的一次海水倒灌

Saline tides



In 2024, saline tide extended up to 40 km upstream in the Pearl River Delta
2024年珠江三角洲咸潮上溯距离最远达40公里

CONTENTS 汇报提纲

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2.1 China Attaches Great Importance to Climate Change Response
中国政府高度重视气候变化应对

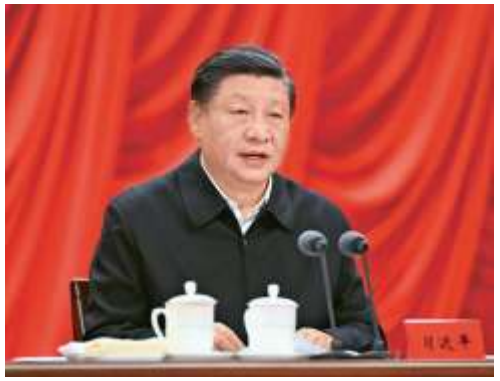
- China has set forth the dual carbon goals —**"peaking carbon emissions by 2030 and reaching carbon neutrality by 2060"**. This commitment underscores China's in building a global community of shared future and its intrinsic need to secure sustainable development and advance harmonious human-nature coexistence

明确提出"努力在2030年前实现碳达峰，在2060年前实现碳中和"的双碳目标，这一重大战略决策，既是中国推动构建人类命运共同体的责任担当，也是保障自身可持续发展、实现人与自然和谐共生的内在需求

2.1 China Attaches Great Importance to Climate Change Response
中国政府高度重视气候变化应对

- President Xi Jinping has personally charted the course and issued a series of important discourses, speeches, directives and instructions, providing **fundamental guidance and a concrete plan for the high-quality development of water conservancy and for proactively adapting to and actively addressing climate change**

习近平总书记亲自擘画，做出一系列重要论述和重要讲话以及指示批示，为主动适应与积极应对气候变化提供了根本遵循和行动指南



Prioritizing water conservation, balancing spatial distribution, taking systematic approaches & promoting government-market synergy
节水优先、空间均衡、系统治理、两手发力

2014

Water-aligned urban planning, land use, population distribution, and industrial production
以水定城以水定地、以水定人、以水定产

2014

Yangtze River Economic Belt Development Strategy
长江经济带发展战略

2018

National Strategy for Ecological Protection and High-Quality Development of the Yellow River Basin
黄河流域生态保护和高质量发展国家重大战略

2019

Rigid water resources constraint system
建立水资源刚性约束制度

Accelerated construction of the main framework and major arteries of the national water network
加快构建国家水网主骨架和大动脉

2021

2025

Guidelines on Comprehensively Advancing River Protection and Governance
关于全面推进江河保护治理的意见

China prioritizes the response to water security challenges posed by climate change, placing climate change into its national strategic framework
中国政府高度重视应对气候变化带来的水安全挑战，将水利应对气候变化纳入国家战略全局

2.2 Multiple Measures are Taken to Ensure Water Security
多措并举保障水安全

- Based on China's national and water conditions, and new challenges posed by climate change, Ministry of Water Resources (MWR) has hammered out five measures to address relevant issues, thereby ensuring national water security

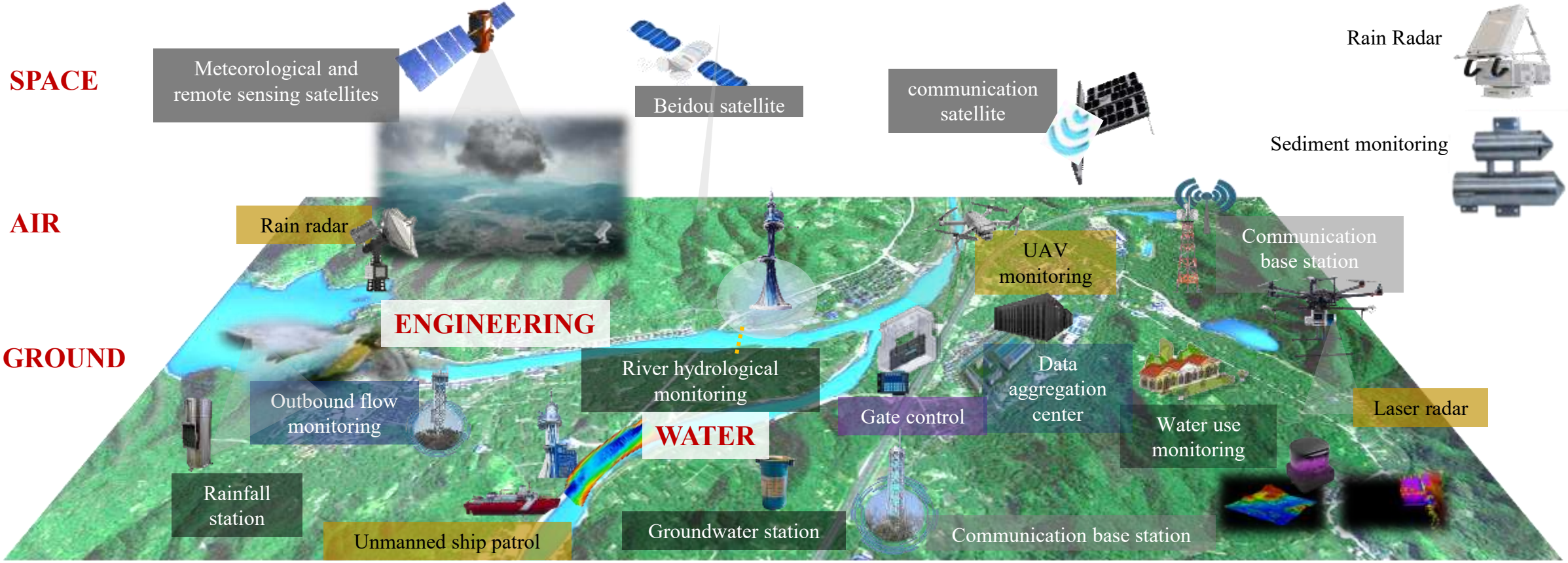
立足中国国情水情和气候变化的新形势，水利部强化五项具体措施，统筹解决水灾害、水资源、水生态、水环境，切实保障国家水安全

- Minister Li Guoying proposed six implementation pathways for high-quality water conservancy development and a series of water management initiatives, including smart water conservancy
- **李国英部长提出水利高质量发展六条实施路径、智慧水利等系列水利发展举措**

2.3 Specific Measures to Address Climate Change
应对气候变化的具体措施

2.3.1 Enhance rainfall and hydrological monitoring and forecasting 提升雨水情监测预报水平

- **Integrated "space–air–ground–water–engineering" monitoring and sensing system: Remote sensing satellites, rain radars, UAVs, unmanned ships, and dam safety and hazard detection equipment. Comprehensive information on 26 million physical elements across 72 categories has been integrated by MWR, supporting full-process water governance**
  构建"天空地水工"一体化监测感知系统。创新发展遥感卫星、水利测雨雷达、无人机、无人船和堤坝隐患探测设备等新型智能感知设备，水利部本级汇集72类2600万个水利物理对象全要素信息，支撑水利治理管理活动全过程



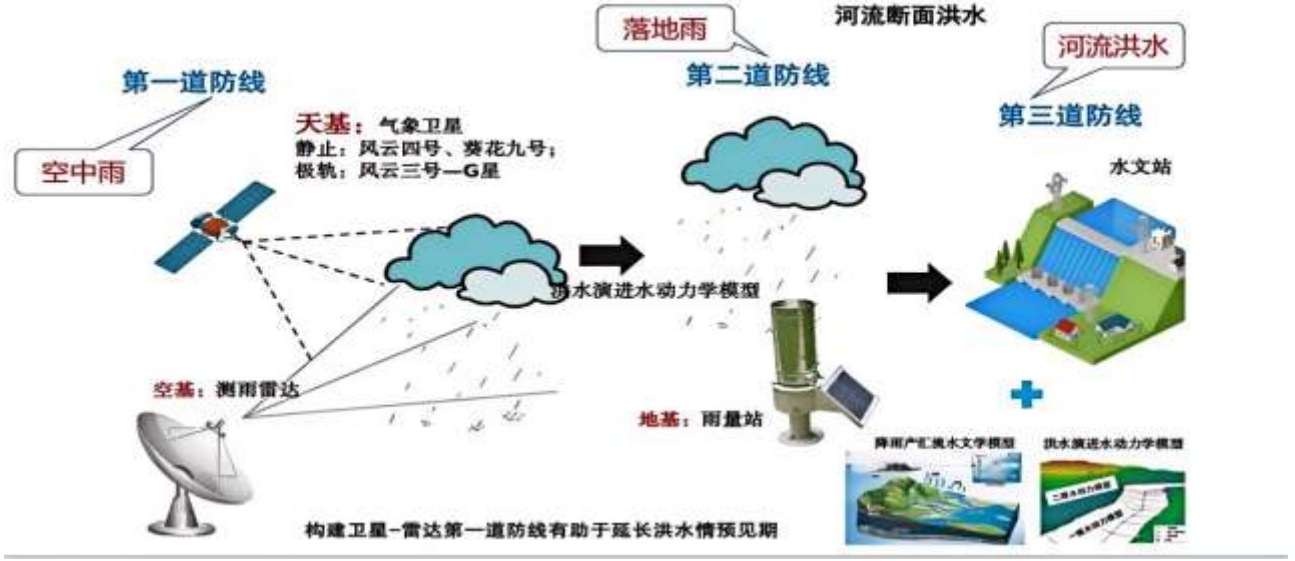
2.3 Specific Measures to Address Climate Change
应对气候变化的具体措施

2.3.1 Enhance rainfall and hydrological monitoring and forecasting 提升雨水情监测预报水平

- "Three-Line Defense" flood early warning system establishment: Launched water resources remote sensing satellites, established 212 hydrological rainfall radars, 133,000 rainfall and gauging stations, and 62,000 small reservoirs equipped with rainfall and water regime monitoring and forecasting facilities. This system boosts forecast lead time for major rivers from 3 to 10 days and greatly improving accuracy for extreme rainstorm and events

雨水情监测预报“三道防线”。成功发射水利遥感卫星，建成水利测雨雷达212部，雨量站、水文（位）站等测站13.3万处，小型水库雨水情测报设施6.2万座，极端暴雨洪水预见期和精准度进一步提高，大江大河洪水预见期由3天延长至10天

Defense line 1: rain-in-the-air Defense line 2: ground-rain Defense line 3: river flooding



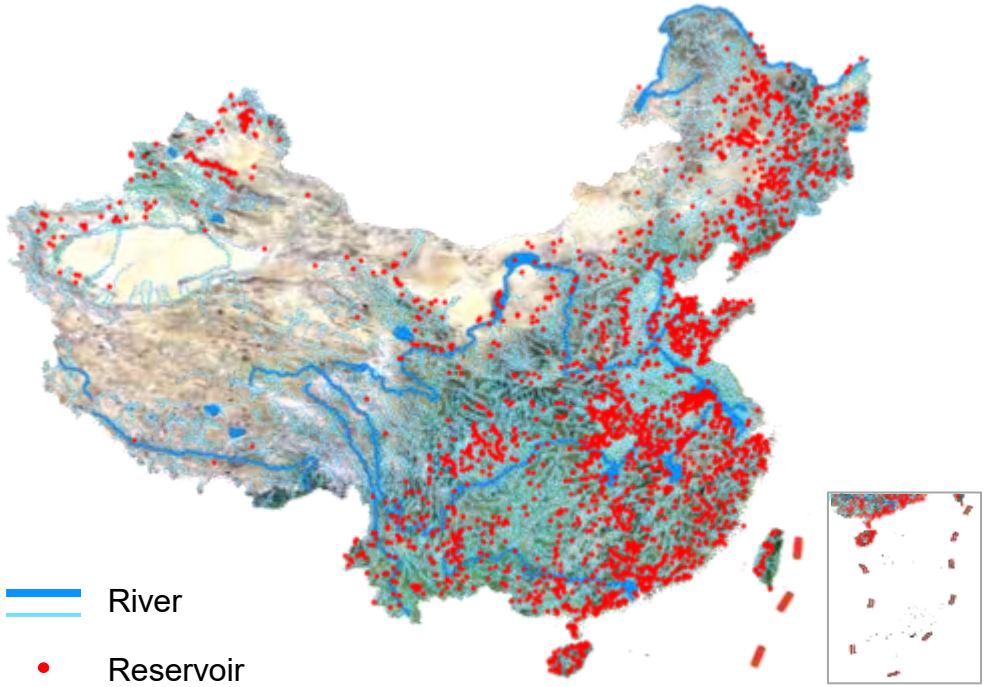
Rainfall and hydrological monitoring and forecasting system 雨水情监测预报体系

2.3 Specific Measures to Address Climate Change
应对气候变化的具体措施

2.3.2 Improve engineering system for flood and drought disaster prevention 完善水旱灾害防御工程体系

- Enhanced river basin flood control engineering system: Over the past 5 years, China has constructed 105 large and medium-sized reservoirs, and reinforced and dredged 17,998 reservoirs, increasing total storage capacity by over 70 billion m^3. Also, 3,741 small and medium-sized rivers have been systematically rehabilitated, substantially strengthening basin-wide flood defense capabilities

  完善流域防洪工程体系。近五年全国新建大中型水库105座，除险加固、清淤17998座，库容增加超700亿m^3，大大扩展了洪水调蓄空间；系统治理中小河流3741条，流域洪水防御能力显著提升



Existing reservoirs 已建水库

Reinforcement and dredging to increase reservoir capacity
除险加固和水库清淤增加库容

2.3 Specific Measures to Address Climate Change
应对气候变化的具体措施

2.3.2 Improve engineering system for flood and drought disaster prevention 完善水旱灾害防御工程体系

- Implementation of major **national water network projects**: The construction of a comprehensive, secure, efficient, green, intelligent, with well-connected flows and orderly regulation, boosting national water security and climate resilience

实施国家水网重大工程。有序建设“系统完备、安全可靠，集约高效、绿色智能，循环通畅、调控有序”的现代水网体系，显著提升国家水安全保障与气候适应能力

National core water network: The South-to-North Water Diversion Project 国家骨干水网：南水北调工程

- Coordinated solutions for water resources, water ecosystem, water environment, and water disasters

  统筹解决水资源、水生态、水环境、水灾害问题

- The South-to-North Water Diversion Project has transferred **85 billion m^3** of water, benefiting **195 million** population

  南水北调工程累计调水850亿m^3，惠及1.95亿人口

2.3 Specific Measures to Address Climate Change
应对气候变化的具体措施

2.3.3 Strengthen the coordinated operation of water projects 强化水利工程联合调度

- Integrated reservoir flood control system for major river basins in China: Aims to **coordinate flood control, utilization, and shaping**. Since 2021, 26,833 large and medium-sized reservoirs have been precisely operated, successfully managing 55 numbered floods, **without any breach of important dykes**. This system also effectively mitigated unprecedented droughts in the Yangtze and Pearl River Basins, securing drinking water supply and irrigation

建立长江等七大江河流域的防洪工程群联合调度系统，有效**实现洪水控制、利用和塑造协调统一**。2021年以来精细调度大中型水库 26833 座（次），成功应对 55 次大江大河编号洪水，**实现重要堤防无决口**。同时有效应对长江、珠江等流域罕见旱情，保障旱区饮水与灌区灌溉

Coordinated operation of complex reservoirs system in the Yangtze River Basin (132 large dams, 118 billion m^3)
长江水库群联合调度（132座大型水库、1180亿立方米）

Coordinated flood management
洪水管理：三个洪水协调统一

2.3 Specific Measures to Address Climate Change
应对气候变化的具体措施

2.3.3 Strengthen the coordinated operation of water projects: Case of Flood Control
强化水利工程联合调度：洪水控制典型案例

- **Joint Reservoir & Sluice Operation System for Tanjiang River Basin**
  - Precise regulation of 22 large/medium-sized reservoirs & 6 sluice gates
- **2025 Typhoon "Huajiasha"**
  - Combined impacts: typhoon, storm surge, rainstorm flooding
  - Effectively prevented casualties and property loss

- **研发了潭江流域水库闸坝群联合调度系统，实现流域22座大中型水库、6座水闸的精准调度**
- **2025年成功抵御"桦加沙"台风、天文大潮、暴雨洪水叠加灾害**

Digital twin of theTanjiang River
数字孪生潭江

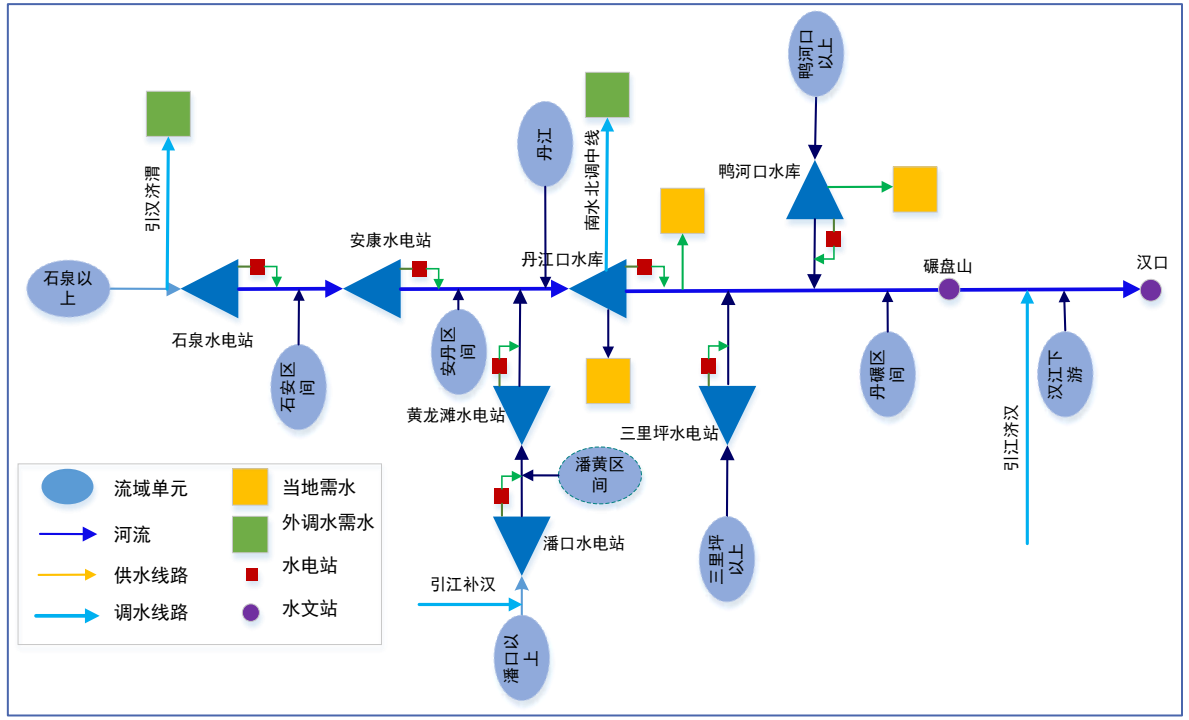
Flood and tide forecasting and regulation modelling system for the Tanjiang River Basin
潭江流域洪潮预报调度模型系统

2.3 Specific Measures to Address Climate Change
应对气候变化的具体措施

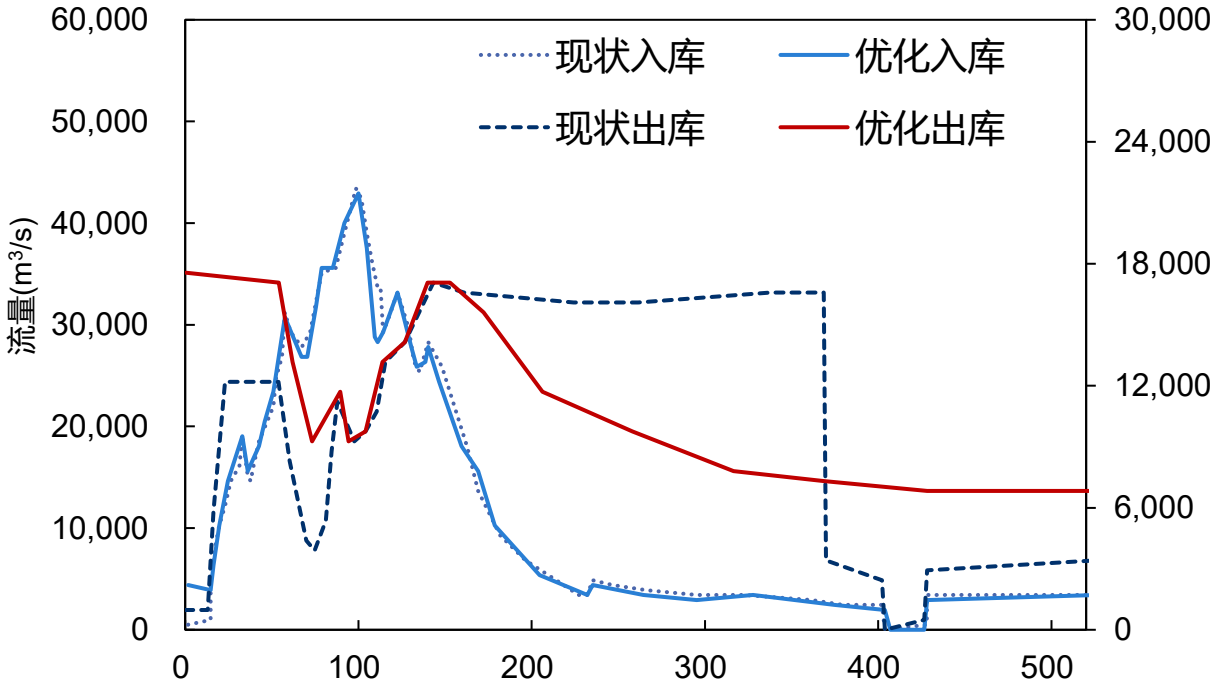
2.3.3 Strengthen the coordinated operation of water projects: Case of Flood Utilization
强化水利工程联合调度：洪水利用典型案例

- Joint Operation of Hanjiang River Reservoirs
- Improved flood resource utilization by 10%
- Increased annual power generation by 147 million kW/h
- Effective response to the "rapid drought-to-flood transition" in the Hanjiang River Basin (2025)

- 通过汉江水库群联合调度，抬高丹江口等水库汛末蓄水量，洪水资源利用率增加10%，年均增发电量1.47亿度，有效应对了2025年汉江流域"旱涝急转"



Large reservoir group in the Hanjiang River Basin (18 major reservoirs)
汉江流域大型水库群(18座大中型水库)



Comparison of flood regulation processes at the Danjiangkou Reservoir
丹江口水库洪水调度过程对比

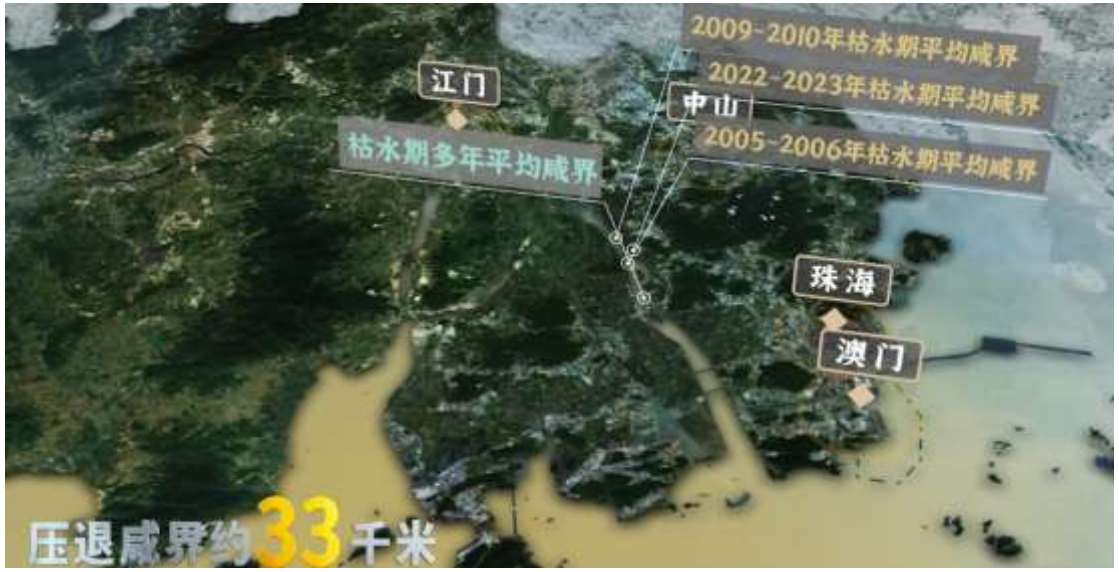
2.3 Specific Measures to Address Climate Change
应对气候变化的具体措施

2.3.3 Strengthen the coordinated operation of water projects: Case of Flood Shaping
强化水利工程联合调度：洪水塑造典型案例

- Unified water regulation to "suppress salinity and supplement freshwater" in the Pearl River: a cumulative increase of 75.6 billion m^3 in water discharge over the past two decades. It has effectively ensured water supply security for the Pearl River Delta, Hong Kong, Macau, and other relevant regions, delivering multiple benefits across water supply, ecological protection, power generation, and navigation

珠江流域水量统一调度实现“压咸补淡”，20年来累计增泄水量756亿m^3，有力保障珠江三角洲、香港、澳门等供水安全，实现供水、生态、发电、航运多方共赢

Water project system in the Pearl River Basin (10 large reservoirs)
珠江流域水利工程体系（10座大型水库）



Effectiveness of "salinity suppression and freshwater supplement" in the Pearl River Basin. During dry seasons, the average saline intrusion boundary has been pushed seaward by approximately 30 km
珠江流域“压咸补淡”成效。枯水期平均咸界向海洋推进30km

2.3 Specific Measures to Address Climate Change
应对气候变化的具体措施

2.3.4 Promote the construction of a digital twin system 推进数字孪生体系建设

- Smart operations: China actively applies digital twin and other intelligent technologies to build an integrated **"Forecasting, Early Warning, Simulation, and Contingency Planning" system,** empowering core operations such as basin-scale flood control, water resources management, and allocation

  打造智能业务。积极应用数字孪生等数智技术，建设 "四预" 业务系统，赋能流域防洪、水资源管理与调配等业务

Digital twin river basin
数字孪生流域

Digital twin water project
数字孪生水利工程

Digital twin water network
数字孪生水网

2.3 Specific Measures to Address Climate Change
应对气候变化的具体措施

2.3.4 Promote the construction of a digital twin system 推进数字孪生体系建设

- Smart upgrades of management for major water resources infrastructure: Propose "Safe Dams, Ecological Dams, and Intelligent Dams" to modernize the construction, operation, and management capabilities of dams

  推动水资源重大基础设施管理智慧升级。创新提出安全大坝、生态大坝、智能大坝，提升大坝现代化建设运行管理能力

Underwater robots and the "Yulong" submersible
水下机器人、"禹龙号"潜水器

Fish passages and ecological regulations
鱼道、生态调度

Automated monitoring, smart construction, and digital twin
自动监测、智能建造、数字孪生

2.3 Specific Measures to Address Climate Change
应对气候变化的具体措施

2.3.5 Strengthen scientific and technological innovation 强化科技创新

- Climate Change Research Center (RCCC) of Ministry of Water Resources: Aims to conduct climate change impact assessments and develop response strategies

成立气候变化专门研究机构——水利部应对气候变化研究中心，开展气候变化影响评估、应对策略研究

- Drafting national reports, scientific reports, and policy recommendations, such as the *National Climate Change Adaptation Strategy 2035*

负责编写《国家适应气候变化战略：2035》等气候变化国家评估报告、科学报告及政策建议

- Substantial research achievements in extreme events, water supply security, urban flooding, and others
- Active participation in international cooperation: Chairs of WMO Working Group, IAHS & IAHR Technical Committee

在极端事件、供水安全、城市洪涝等方面科研成果丰硕；积极开展国际合作，WMO工作组组长、IAHS和IAHR专委会主席单位

RCCC's hydrological experimental field and facilities
水利部应对气候变化中心水文实验场地及设施

Active engagement in international major research programs
积极参加国际重大研究项目

2.3 Specific Measures to Address Climate Change
应对气候变化的具体措施

2.3.5 Strengthen scientific and technological innovation 强化科技创新

- **Strong research funding support: Over the past 5 years, national investment in scientific research for climate change adaptation in water sector has exceeded 30 billion yuan, with an increase of over 20% year-on-year**
  持续加大科研支持力度。近五年为水利应对气候变化，国家累积投入科研经费超过30亿元，同比增加20%以上

Minister Li Guoying proposed a "three-pronged" approach to advance innovation in water conservancy science and technology, basic theoretical research, applied fundamental research, and high-tech R&D.
李国英部长提出加强水利基础理论研究、应用基础研究、高新技术研发"三箭齐发"的水利科技创新体系

Category 项目类别	Project 项目名称
Basic Theoretical Research 基础理论研究	Climate Change and Water Security 气候变化与水安全
	Evolution Mechanisms of Water Cycle in the Yellow River Basin under Influence of Human Activities and Climate Change 人类活动和气候变化影响下黄河流域水循环演变机理
	Quantitative Attribution of Runoff Changes in Different Climatic Zones under Changing Environmental Conditions 变化环境下不同气候区河川径流变化归因定量识别研究
Applied Basic Research 应用基础研究	Impacts of Climate Change on China's Water Security and Corresponding Countermeasure Research 气候变化对中国水安全的影响及对策研究
High-tech Research and Development 高新技术研发	Research, Development, and Integrated Demonstration of Key Technologies and Equipment for Monitoring, Forecasting, and Early Warning of Rainfall and Water Regime in High-Risk Flood Areas 洪水高风险区雨水情监测预报预警关键技术装备研发及集成示范

2.3 Specific Measures to Address Climate Change
应对气候变化的具体措施

2.3.5 Strengthen scientific and technological innovation 强化科技创新

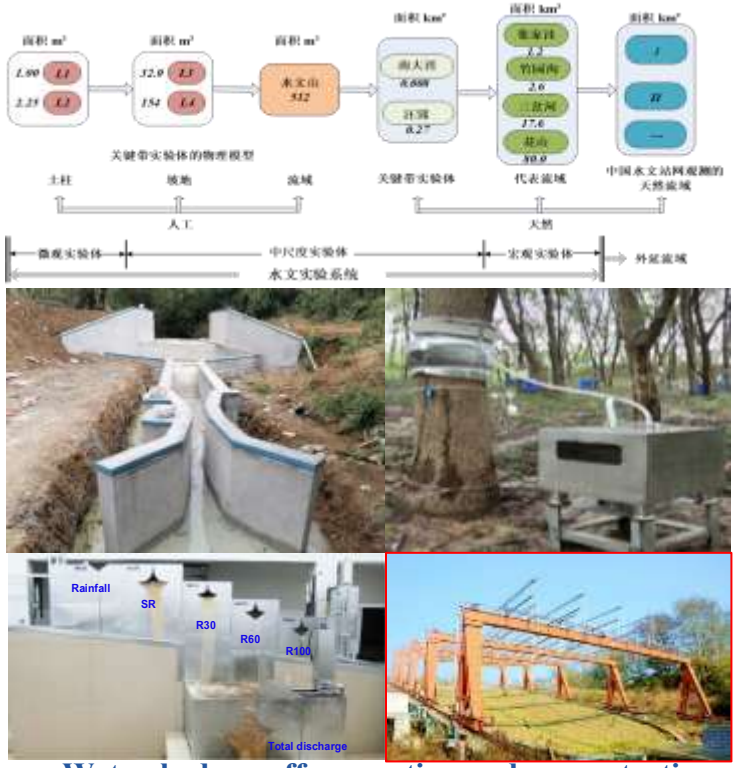
- New progress in fundamental research on climate change impacts, watershed runoff generation and concentration mechanisms, hydrological models, and related fields

  气候变化影响、流域产汇流机理、水文模型等基础研究取得新进展

Expedition on the Qinghai-Xizang Plateau
青藏高原科学考察：河流演变与影响

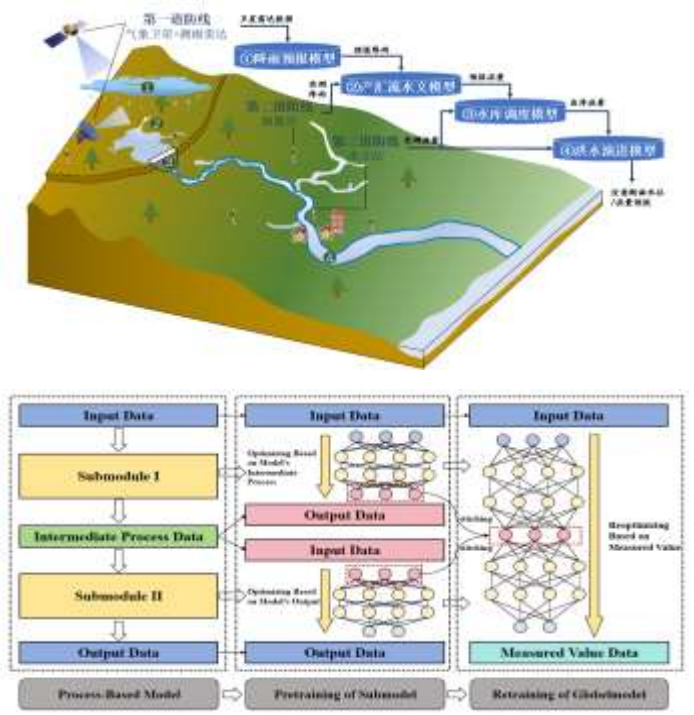
Climate change impacts
深化气候变化影响认知

Field experiments: Understanding mechanisms
野外科学实验：机理认识



Watershed runoff generation and concentration mechanisms under extreme rainfall
揭示极端暴雨下流域产汇流机理

Hydrological model: Physical mechanisms+AI
水文模型：物理机制+AI



Variable-structure dynamic-parameter hydrological model coupling physical mechanisms with AI
研发物理机制与AI耦合的变结构动参数水文模型

2.3 Specific Measures to Address Climate Change
应对气候变化的具体措施

2.3.5 Strengthen scientific and technological innovation 强化科技创新

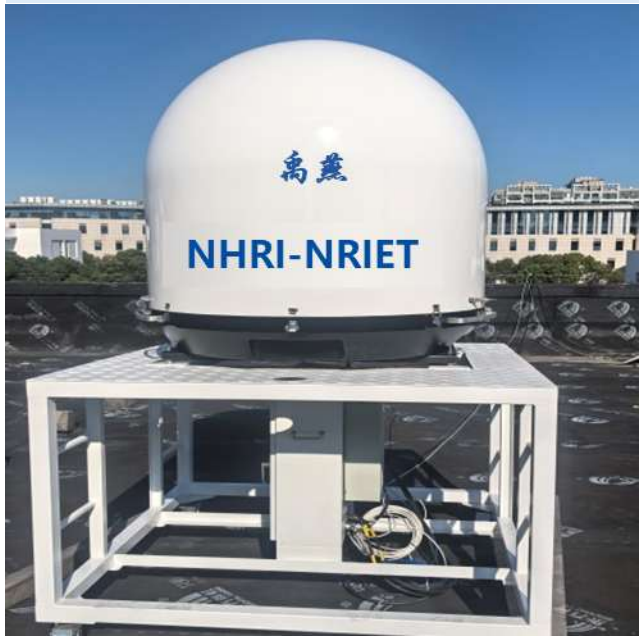
- **Innovative equipment for ultra-high sediment concentration measurement, rainfall monitoring and early warning radar, and deep-water dam defect monitoring**

创新研制超高泥沙含量测量、降雨监测预警雷达、深水大坝病害监测系列装备

Photoelectric sediment concentration meter
光电测沙仪量程世界之最

The measured maximum sediment concentration exceeds the threshold of **1,000 kilograms per cubic meter**
实测最大含沙量突破1100 kg/m³大关

"Yuyan" new-generation rain radar
"禹燕号" 新型测雨雷达



Enabling precise areal rainfall monitoring within a 35-kilometer radius, featuring **low cost, no land acquisition requirements, and easy maintenance**
实现半径35km内面雨量的精准监测，具有成本低、免征地、易维护等优势

"Yulong" manned submersible
"禹龙号" 大坝深水载人潜水器

Achieving a groundbreaking leap in **300-meter-class deep-water detection** and repair technologies for dam engineering
坝工领域300m级深水病害探测修复技术装备突破

CONTENTS 汇报提纲

I Global Climate Change and Its Impacts
全球气候变化及其影响

II China's Response to Climate Change in Water Sector
水利应对气候变化的中国方案

III China's Call for Action on Future Climate Change Challenges
应对未来气候变化的中国呼吁

3.1 Deepening Practical Cooperation in China-Europe Scientific Research
深化中欧科研务实合作

- **Leveraging the scientific and technological strengths of both China and European countries, we will engage in pragmatic cooperation focused on enhancing the "water resources systems resilience". This collaboration aims to strengthen the China-Europe water security framework and contribute to the achievement of the UN SDGs**

发挥中欧科技优势，围绕水资源系统韧性提升开展务实合作，为筑牢中欧水安全屏障，落实联合国可持续发展目标贡献力量

- New monitoring and sensing equipment
- Large-scale drought regulation and response technologies
- Extreme rainstorm and flood forecasting and operation technologies
- Next-generation high-resolution hydro-climatic models
- Seawall construction, salt tide management, and ecological restoration technologies

- 新型监测感知装备
- 大范围干旱调控应对技术
- 极端暴雨洪水预报调度技术
- 新一代高分辨率水文-气候模型
- 海堤建设、咸潮治理、生态修复技术等

UN 2030 SDGs
联合国可持续发展目标

SDG6: Clean water and sanitation
SDG7: Affordable and clean energy
SDG11: Sustainable cities and communities
SDG13: Climate action

3.2 Co-building a China-Europe Science and Technology Alliance
共建中欧科技联盟

- **Building a new platform for scientific and technological cooperation: China-Europe Alliance for Climate Change Adaptation and Water-Related Disaster Prevention Technologies**
  打造科技合作新平台：中欧气候变化适应与涉水灾害防御科技联盟

Foundation合作基石

1. A decade of accumulated exchanges
2. High alignment in concepts for addressing climate change
3. 2023 Release of China-Europe Science and Technology Cooperation Guidelines

Areas 合作领域

1. Flood and drought disaster prevention
2. Efficient utilization of water resources
3. Water ecological protection and restoration

Mechanisms 合作机制

1. Establishment of the Alliance Secretariat in Beijing
2. Formation of thematic collaboration groups
3. Leveraging China-Europe government projects and diversified funding sources

CHINA EUROPE Water Platform
Funded by the European Union

ETC.

University Institution Enterprise Government

3.2 Co-building a China-Europe Science and Technology Alliance
共建中欧科技联盟

- **Through China-EU science and technology cooperation, we advance flood forecasting technology and hydrodynamic-water environment modeling toward intelligence, precision, and multi-model integration to strengthen flood prevention, disaster mitigation, and water security capabilities, making sci-tech collaboration a solid pillar of China-EU climate action.**
- **通过中欧科技合作，推动洪水预报技术、水动力水环境模拟模型向智能化、精细化、多模型耦合方向发展，共同提升防洪减灾与水安全保障能力，让科技合作成为中欧应对气候变化行动的坚实支撑**

Model Technology 模型技术	Comparison Metrics 对比维度	Europe 欧洲	China 中国
Flood simulation and forecasting models 洪水模拟预报模型与模式	Core Models 核心模型	LISFLOOD, NAM, etc.	XAJ Model, Northern Shaanxi, NHRI Model, Distributed Hydrological Model 新安江、陕北、南科院、分布式水文模型等
	Applicable Scenarios 适宜场景	Lowlands, flash floods in mountainous areas 低地、山洪	Diverse and complex terrains ranging from plains, mountains to plateaus, coupled with various climate zones including arid, semi-arid, and humid regions 平原、山地、高原等多元复杂地形，干旱、半干旱、湿润等多种气候区
	Forecasting Modes 预报模式	Cross-border multi-country coordination (supported by EFAS, serving 70+ countries) 跨境多国协同（EFAS支撑70+国家）	Graded linkage nationwide – a ministry-basin-province-city-county coordinated system within China's flood forecasting framework 全国分级联动（中国洪水预报系统，水利部-流域-省-市-县联动）
	Core Advantages 核心优势	Meteorological-hydrological coupling, ensemble forecasting, probabilistic forecasting, open sharing 气象-水文耦合、集合预报、概率预报、开放共享	Integrated forecast & operation, AI-enhanced digital twin, multi-source data assimilation, adaptability to complex climates and terrains 预报调度一体化、数字孪生+AI融合、多源数据同化、复杂气候地形适配
Hydrodynamic-environmental numerical simulation software 水动力环境数值模拟软件	Core Models 核心模型	MIKE series, Delft3D, TELEMAC-MASCARET and InfoWorks ICM	Flood analysis software IFMS (IWHR), hydrodynamic- environment simulation software PHM (NHRI), and independent software platforms for major river basins such as the Yangtze River and Yellow River 洪水分析软件IFMS（水科院）、水动力水环境模拟软件PHM（南科院），长江、黄河等流域自研软件
	Core Advantages 核心优势	Highly versatile, well-commercialized 通用性强、商业化程度高	Strong adaptability to local issues (silt, fine sand); limited maturity, integration, and general applicability 淤泥、粉砂等本土问题适配性好；但成熟度、集成度、通用性待提升

3.3 Advancing Joint Participation in Climate Change Initiatives
积极参与应对气候变化活动

- China will partner with European countries to actively engage in global climate initiatives, jointly enhance capacity in water sector, and promote inclusive benefits for communities worldwide

中欧携手积极参与全球应对气候变化活动，共同提升水利领域应对气候变化能力，让更多的人从中受益

联合国政府间气候变化专门委员会
IPCC（1998 - ）

政府间水文计划
UNESCO-IHP（1975 - ）

世界气象组织
WMO（1950 - ）

联合国气候变化框架公约
UNFCCC （1992 - ）

国际大坝委员会
ICOLD（1928 - ）

联合国减少灾害风险办公室
UNDRR （1999 - ）

中 国 水 利
CHINA WATER

NHRI Since 1935
南京水利科学研究院

Email: nhri@nhri.cn
Tel: +86 25 85828116

Thank you for your attention!

都江堰
Dujiangyan Project
战国时期
Warring States Period

灵渠
Lingqu Canal
秦代
Qin Dynasty

京杭大运河
Beijing-Hangzhou Grand Canal
三国至唐宋时期
From the Three Kingdoms Period to Tang and Song Dynasties

古罗马高架引水渠
Roman Aqueduct
公元二世纪初
Early 2nd century CE

苏伊士运河
Suez Canal
十九世纪六十年代
1860s

围海造陆工程
Land Reclamation from the Sea
二十世纪上半叶
First half of the 20th century

胡佛大坝
Hoover Dam
二十世纪三十年代
1930s

阿斯旺大坝
Aswan High Dam
二十世纪六十年代
1960s

三峡大坝
Three Gorges Dam
二十世纪九十年代
1990s

南水北调
South-to-North Water Diversion Project
二十一世纪初
Early 21st century